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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b> <b>G03C 11/14, C03C 1/795</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 90/00760</b> <b>(43) International Publication Date:</b> <b>25 January 1990 (25.01.90)</b>
<b>(21) International Application Number:</b> PCT/GB89/00815 <b>(22) International Filing Date:</b> 14 July 1989 (14.07.89) <b>(30) Priority data:</b> 8817016.2 14 July 1988 (14.07.88) GB <b>(71) Applicant (for US only):</b> PUNTON, Helene, Sarah (heiress of the deceased inventor) [GB/GB]; Ravenshill Cottage, Yewleigh Lane, Upton on Severn, Worcestershire WR8 0QW (GB). <b>(71) Applicant (for all designated States except US):</b> JAMES RIVER GRAPHICS LIMITED [GB/GB]; 28 Lincoln's Inn Fields, London WC2A 3HH (GB). <b>(72) Inventor:</b> PUNTON, Vaughan (deceased). <b>(74) Agents:</b> MARSH, Roy, David et al.; Urquhart-Dykes & Lord, Midsummer House, 419B Midsummer Boulevard, Central Milton Keynes MK9 3BN (GB).		<b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), SU, US.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> PHOTOGRAPHIC PRINTS  <b>(57) Abstract</b> <p>Conventionally photographic prints are provided on a paper substrate which contributes stiffness and opacity to the product but can be adversely affected by photographic processing chemicals. With the invention the photosensitive layer is provided on one surface (2) of a polymeric sheet (1, 11). After its photographic exposure the material is processed to develop the image (10). After processing, the sheet is bonded to a stiff backing substrate (4, 13) (normally paper). The polymeric sheet is opaque and is bonded (12) to the substrate on the surface opposite to the sensitised surface. A suitable material for the opaque polymeric sheet is white pigmented MELINEX polyester from ICI. The opacity of the pigmented polymer just behind the photographic layer, yields a print of excellent optical quality.</p>		

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PHOTOGRAPHIC PRINTSBACKGROUND OF THE INVENTION1. Field of the Invention

This invention relates to photographic prints and their production. By a "photographic print" is meant a developed  
5 photographic image carried on a photographic support.

2. Background Prior Art

Paper is the most widely used photographic support material. Normally the paper is coated, either with baryta or with a polymeric layer applied by extrusion. Wholly  
10 polymeric sheet materials are also used as photographic supports, but generally only for specialised end uses where their high cost can be justified. Such sheet materials may for example be of white-pigmented polyester or triacetate polymer.

15 The use of paper as a photographic support has the drawback that the paper tends to be adversely affected by photo-sensitizing solutions and by processing solutions used to produce the final photographic image. This problem is lessened if the paper carries a polymer coating, but  
20 processing solutions may still penetrate the paper at the edges of the support where the polymer coating is not present to provide a barrier. These problems may be minimised, but not eliminated, by the incorporation of speciality chemicals during production of the paper, but  
25 this naturally adds to its costs, particularly as the choice of chemical is greatly restricted by the requirement that the chemical must not react adversely with the subsequently-applied photosensitive coating or with the processing chemicals.

30 The use of polymeric sheet material as a photographic support avoids the above-described disadvantages, but such

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sheet material tends to lack the rigidity or stiffness necessary to permit the finished print to be readily handled, unless the sheet material is so thick as to be uneconomic. In effect, the cost of paper-based supports  
5 imposes a ceiling on the acceptable cost of potentially competing materials such as polymeric sheet materials (except for certain speciality end uses where the additional cost is acceptable).

European Patent No.7048 B (equivalent to US Patents  
10 Nos.4296198 and 4355099) discloses a process in which photosensitive material on a thin transparent polymeric support is first exposed and developed to produce a positive transparency, and the surface of the transparency carrying the image is then laminated to a main support,  
15 e.g. of paper. The main support is of greater thickness than the transparent support. A pigmented reflective layer is provided between the main support and the image, so that the image may be viewed through the transparent support against the background of the pigmented reflective layer.  
20 The pigmented reflective layer is preferably provided by means of a gelatin coating over the photosensitive material, but may alternatively be present as a coating on the main support. Alternatively the adhesive used to cement the main and transparent supports together may be  
25 pigmented so as to constitute a reflective layer.

The arrangement just described has the advantage that the main paper support is not contacted at any stage with photosensitizing or photographic processing solutions, and thus that the above-described disadvantages of paper are  
30 avoided. A further advantage is that after lamination, the image is protected from damage by the transparent support. Nevertheless, the pigmented reflective layer can give rise to problems. In the preferred arrangement in which this layer is a pigmented gelatin layer, the photographic image  
35 in the final product is backed by a gelatine layer and a cement layer, and these would be expected to lessen the

brightness and sharpness of the image obtained. Furthermore the use of an opacifying agent in the gelatin layer would be a radical and hence unattractive step for companies specialising in photosensitization. Even if this  
5 pigment-coating operation could be satisfactorily carried out, the thinness of the resulting reflective layer would tend to give only limited opacity and hence poor optical characteristics in the finished product. Much the same drawbacks would apply to the use of a pigmented cement or a  
10 pigmented coating on the main support.

It is an object of the present invention to permit the technical benefits associated with polymeric sheet material supports to be obtained at acceptable cost whilst at the same time avoiding the above-described drawbacks associated  
15 with the use of transparent polymeric sheet materials and pigmented reflective layers.

#### SUMMARY OF THE INVENTION

According to the present invention, there is provided a process for the production of photographic prints,  
20 comprising the steps of:-

- a) photographically processing an exposed photosensitized thin flexible polymeric sheet material to produce a positive photographic image on the sheet material; and
  - 25 b) bonding said polymeric sheet material to a stiff backing substrate;
- characterized in that:
- c) the thin polymeric sheet material is opaque and is bonded on its unsensitized surface to said  
30 substrate.

The invention also resides in photographic prints produced

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by the process.

It will be appreciated that the present process has the advantage of permitting photosensitization and photographic processing by the methods currently practised, and that the  
5 opacity of the polymeric sheet material will give rise to a photographic print having excellent optical qualities (clarity, brightness, resolution etc.), since the photographic image is viewed against the background of the opaque sheet material. Such pigmented polymeric sheet  
10 materials are readily available. They may for example be of white opaque polyester e.g. a "Melinex" opaque polyester sheet material as supplied by ICI.

The thickness of the opaque sheet material may vary within wide limits, although use of an excessively thick sheet  
15 material will lead to cost penalties. Typically the thickness of the polymeric sheet material may be in the range of about 30 to about 100  $\mu\text{m}$ , although thinner sheet materials are in principle usable, e.g. down to about 5  $\mu\text{m}$ . As sheet material thickness of about 50  $\mu\text{m}$  is currently  
20 thought preferable for most end uses.

The nature of the stiff backing substrate to which the opaque polymeric sheet material is bonded may vary widely, depending on the nature of the photographic print to be produced. For most purposes, the backing substrate is  
25 preferably of paper although other materials may be used, for example plastics sheet material, metal foil, fabric, and display laminates. When paper is used, it can be designed to impart maximum rigidity for its thickness.

Since the substrate does not come into contact with  
30 photosensitive material or photographic processing solutions, the usual concerns over photosensitivity do not apply. A relatively inexpensive white card product may therefore be used. The substance of such a product would typically be about 150 to about 200  $\text{gm}^{-2}$  for most types of



photographic print, although substances outside this range could be used. Speciality applications may require special backing substrates. For example, prints which have to be mounted for display or exhibition may require a heavier weight backing substrate, for example of a substance of up to about 500 gm<sup>-2</sup>.

The total thickness of the finished prints, i.e. of the sheet material and the backing substrate is preferably of the order of 200 to 250 µm. Its stiffness, as measured by a Lorenzen & Wettres stiffness tester, is preferably of the order of 100 to 150.

Bonding of the opaque polymeric sheet material to the stiff substrate may conveniently be carried out on-line as a part of the photographic processing operation, normally just prior to the cutting operation to produce individual photographic prints. Conveniently, bonding is achieved by the provision of a self-adhesive coating on the surface of the stiff substrate prior to the processing operation, or by applying an adhesive coating as part of the processing operation.

The opaque polymeric sheet material may have any of the surface characteristics conventional in the photographic support field, for example it may have a glossy, matt or embossed finish. Embossing may if desired be carried out after photographic processing and bonding of the polymeric sheet material to the substrate.

The opaque sheet material and/or the substrate may if necessary be treated in conventional manner to prevent build up of static charges or to facilitate writing on the reverse of the print.

In order to enable the invention to be more readily understood, reference will now be made to the accompanying drawings, which illustrate diagrammatically and by way of

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example an embodiment thereof.

#### DETAILED DESCRIPTION

In the drawings:

FIGURE 1 is a diagrammatic side view of a production  
5 line for the production of photographic prints; and

FIGURE 2 is a side view on an enlarged scale of one  
such photographic print.

Referring to Figure 1, an opaque polymeric sheet material 1  
carrying developed photographic images on its upper surface  
10 2 is shown emerging from a photographic processing station  
indicated as 3. A roll 4 of stiff backing substrate  
material carrying a self-adhesive coating and a releasable  
protective covering over the adhesive coating is positioned  
downstream of the processing station 3 and opposite a  
15 support roll 5, such that the sheet material 1 passes  
between and in contact with the rolls 4 and 5. The roll 4  
is arranged to unwind at the same peripheral speed as the  
speed of the sheet material 1. The releasable protective  
covering is separated from the adhesive coating as the roll  
20 4 unwinds, and the used protective covering is reeled up  
into a roll 6. A pair of opposed nip rolls 7 is positioned  
downstream of the rolls 4 and 5 so as to press the sheet  
material 1 into firm contact with the adhesive coating on  
the backing substrate and to form a laminate (the backing  
25 substrate is shown as 8 when in the unwound condition). A  
guillotine 9 is positioned downstream of the nip rolls 7  
and 8 so as to chop the laminate into individual prints.

Referring now to Figure 2, the photographic print comprises  
a developed photographic image 10 on an opaque polymeric  
30 sheet material 11. A conventional protective gelatin layer  
(not shown) may be present over the photographic image. The  
sheet material 11 is bonded by an adhesive layer 12 to a  
stiff backing substrate 13.

C L A I M S

1. A process for the production of photographic prints, comprising the steps of:-

5 a) photographically processing an exposed photosensitized opaque polymeric sheet material to produce a positive photographic image on the sheet material; and

b) bonding said polymeric sheet material to a relatively stiff backing substrate;

characterized in that:

10 c) the thin polymeric sheet material is opaque and is bonded on its unsensitized surface to said substrate.

2. A process as claimed in claim 1, characterized in that the polymeric sheet material has a thickness in a  
15 range of from 30 to 100  $\mu\text{m}$ .

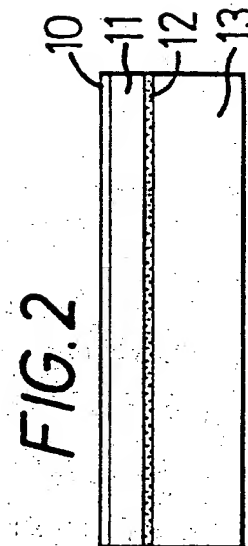
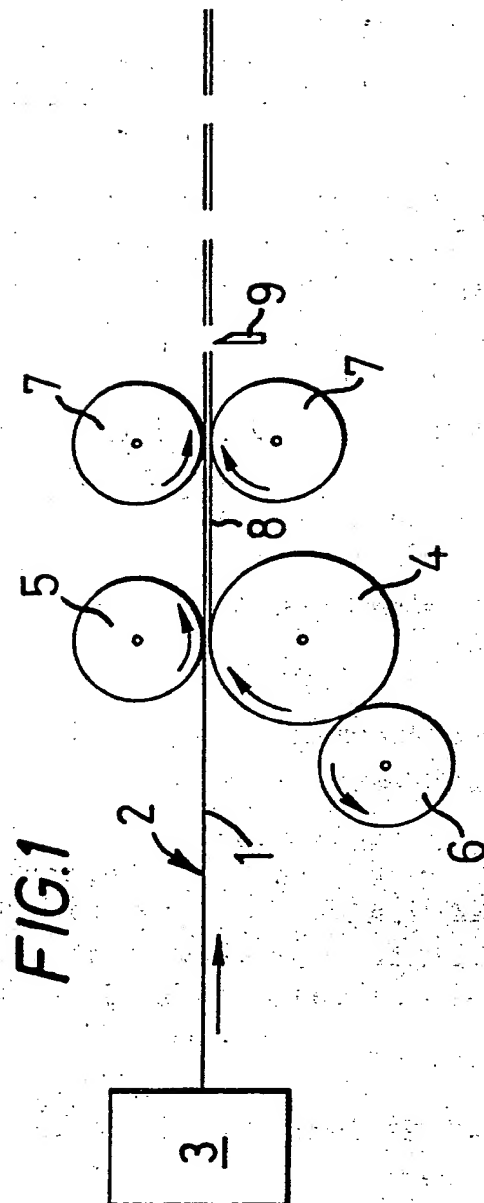
3. A process as claimed in claim 1, characterized in that the polymeric sheet material is a white polyester sheet material.

4. A process as claimed in any one of the preceding  
20 claims characterized in that the backing substrate is a white card the weight of which lies in a range of from 150 to 200  $\text{g m}^{-2}$ .

5. A process as claimed in claim 1, substantially as hereinbefore described.

25 6. Photographic prints produced by a process as claimed in claim 1 or 5.


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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 89/00815

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC <sup>5</sup> G 03 C 11/14, G 03 C 1/795		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC <sup>5</sup>	G 03 C 11/14, G 03 C 1/795, D 21 H 1	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> *		
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X,Y	EP, A, 0182253 (KONISHIROKU PHOTO) 28 May 1986 see page 16, line 1 - page 17, line 3; claims; example 2 --	1-6
X,Y	Patent Abstracts of Japan, volume 11, no. 12 (P-535)(2459), 13 January 1987, & JP, A, 61186957 (KONISHIROKU PHOTO IND CO LTD) 20 August 1986, see the abstract --	1-6
Y	GB, A, 1558849 (KIMBERLEY-CLARK) 9 January 1980 see page 2, lines 98-110; claims --	4
A	EP, A, 0007048 (CIBA-GEIGY) 23 January 1980 cited in the application --	
A	H.M. Lester: "Photo-Lab-Index", 9th edition, 1947, Morgan and Lester, (New York, US), see page 11-25, last paragraph - page 11-26, first paragraph	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
20th September 1989		19. 10. 89
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		 <b>T.K. WILLIS</b>

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 8900815

SA 30360

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A- 0182253	28-05-86	JP-A- 61118746	06-06-86
GB-A- 1558849	09-01-80	None	
EP-A- 0007048	23-01-80	AT-T- 392	15-11-81
		CA-A- 1143990	05-04-83
		JP-A- 55015196	02-02-80
		US-A- 4296198	20-10-81
		US-A- 4355099 -	19-10-82

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